

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of : Customer Number: 20277  
Takeshi HIKATA : Confirmation Number: 7075  
Application No.: 10/590,011 : Group Art Unit: 1712  
Filed: August 21, 2006 : Examiner: HORNING, Joel G.  
For: CATALYST STRUCTURE AND METHOD OF MANUFACTURING CARBON  
NANOTUBE USING THE SAME

**REPLY BRIEF**

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

The following Remarks are respectfully submitted in response to issues raised in the Examiner's Answer dated November 16, 2011, pursuant to 37 C.F.R. § 41.43(b).

**REMARKS*****Delzeit does not remotely suggest the claimed structure***

Delzeit does not suggest the claimed assembly of a plurality of catalyst structures because Delzeit does not suggest the **catalyst structure is shaped as a pipe** with its even upper surface serving as a crystal growth surface, the catalyst structure including a catalytic material that forms a ring corresponding to a carbon nanotube on the crystal growth surface, and **at least part of a side of the structure shaped as a pipe has a non-catalytic material** with substantially no catalytic activity with respect to a growth of the crystalline carbon, as required by claim 1.

On page 5 of the Examiner's Answer, the Examiner alleged Delzeit teaches, "the structure of the catalyst can be formed into arrays (an assembly of a plurality of catalyst structures) by using masks with regular or irregular arrays of apertures. These apertures can each be formed into a wide variety of aperture patterns, shapes, **even numbers or letters, such as the number 8 which is a two pipe structure, or zero, which would be a single pipe aperture**" (emphasis added). The emphasized portion is not taught by Delzeit, but rather is merely an unsupported conclusion by the Examiner. Although the Examiner cited to a portion of Delzeit that allegedly teaches the emphasized portion, there is no suggestion of such a teaching in the cited portions of Delzeit.

On page 8 of the Examiner's Answer, the Examiner alleged, "the number 8 shape consists of two rings so it **must be a double pipe** and read upon the claimed shape" (emphasis added). Further, the Examiner found that the structure of Fig. 4 of Delzeit is shaped like a pipe. These findings are traversed, the Examiner has no basis for these findings. There is simply no suggestion in Delzeit that a so-called "double pipe" is formed and that in Fig. 4 the non-catalytic layer is shaped like a pipe. On page 9, the Examiner uses circular reasoning to find that Figs. 4 and 5 teach a pipe-shaped non-catalytic layer. As reasoned by the Examiner, "[i]t is readily apparent from this structure that **when the structures are horizontally patterned (e.g. into a pipe shape)**, the vertically exposed surfaces of the catalyst material in the chosen pipe pattern will include exposed non-catalytic material . . ." (emphasis added). However, there is no teaching or suggestion in Delzeit of horizontally patterning the portions of the Delzeit structure comprising non-catalytic material. The Examiner's finding is merely an unsupported conclusory statement. Even if the Fig. 2G of Delzeit is considered to be a double pipe, as asserted by the Examiner, the best Delzeit would teach is that only the catalytic material is pipe-shaped. Delzeit

simply does not suggest either a single pipe or a “double pipe” structure wherein **at least part of a side of the structure shaped as a pipe has a non-catalytic material** with substantially no catalytic activity with respect to a growth of the crystalline carbon, as required by claim 1.

In the present invention, the catalytic material forms a ring in the crystal growth surface 22 where the whole of the catalyst structure is shaped as a pipe, as shown in Fig. 2C. Delzeit, on the other hand, arguably discloses that the structure of the catalyst can be formed as the number 8, which is a two-ring shape where the whole of the structure is a layered structure, as shown in Figs. 1, 4, and 5.

The Examiner asserted, "it would have been obvious to a person of ordinary skill in the art at the time of invention to create the multilayer molybdenum catalyst layer with the silver non-catalytic layer on the top side of the structure in the shape of pipe" in the paragraph bridging pages 5 and 6 of the Examiner's Answer. However, even if it would have been obvious, Delzeit fails to teach or suggest that non-catalytic portions, such as substrate 41, in Fig. 4 is shaped as a pipe. Therefore Delzeit does not disclose **at least part of a side of the structure shaped as a pipe has a non-catalytic material** with substantially no catalytic activity with respect to a growth of the crystalline carbon, as required by claim 1.

In the present invention, the catalytic structure is shaped as a pipe and includes a tunnel-like throughhole 63 within it (Fig. 6). Therefore, when the feedstock gas flows in a direction substantially perpendicular to the crystal growth surface, the feedstock gas is passed through the throughhole to prevent turbulence of the feedstock gas near the catalytic base, thereby allowing a carbon nanotube to be produced with substantially no loss of or variation in its geometry (see page 9, lines 14 to 18 of the specification). Delzeit's structure has no throughhole within it, so

the feedstock gas cannot flow in a direction substantially perpendicular to the crystal growth surface. Thus, Delzeit does provide or suggest the benefits of the present invention.

**Conclusion**

Appellant respectfully submits that the Examiner's rejection of claims 1 and 3-5 as being unpatentable under 35 U.S.C. § 103, as evidenced by Delzeit; and claim 6 as being unpatentable under 35 U.S.C. § 103, as evidenced by Delzeit and Fan et al. are not legally viable. Appellant submits the Examiner has committed reversible and harmful error in maintaining these rejections. Appellant, therefore, respectfully solicits the Honorable Board to reverse the Examiner's rejections of claims 1 and 3-6.

Respectfully submitted,

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